

*March 1957 (file copy)*

# **JOSIAS RIVER**

## **Ogunquit**

## **MAINE**

## **SURVEY**

### **(REVIEW OF REPORTS)**

**CORPS OF ENGINEERS, U. S. ARMY  
OFFICE OF THE DIVISION ENGINEER  
NEW ENGLAND DIVISION, BOSTON, MASS.**

**MAY 9, 1957**

**23**

SURVEY  
REVIEW OF REPORTS

JOSIAS RIVER

OGUNQUIT

MAINE

SYLLABUS

The Division Engineer finds that prospective benefits are sufficient to warrant further improvement of Josias River, Ogunquit, Maine. He recommends modification of the existing project to provide for additional anchorage of approximately one acre 5 feet deep, extending northwest from the existing 5 foot anchorage in Flat Pond. The estimated first cost of the additional anchorage area is \$340,000. The benefit cost ratio is 1.3. This recommendation is made subject to certain conditions of local cooperation, which include a local cash contribution of 25 percent of the cost of the anchorage, estimated at present to be \$85,000. The cost of the work to be borne by the United States is estimated to be \$255,000, with \$500 annually for maintenance in addition to that now required.

The Division Engineer further finds that the construction of a single breakwater as originally proposed by local interests will not provide the desired protection, and that an alternative system of breakwaters is not warranted at this time.

## TABLE OF CONTENTS

<u>Paragraph No.</u>	<u>Subject</u>	<u>Page No.</u>
1	Authority.....	1
4	Scope of Study.....	1
5	Description of Navigation Conditions.....	2
6	Tributary Area.....	2
7	Bridges.....	3
8	Prior Reports.....	3
9	Existing Corps of Engineers Project.....	4
10	Local Cooperation on Existing Project.....	4
12	Other Improvements.....	5
13	Terminal Facilities.....	5
16	Improvement Desired.....	6
20	Commerce.....	7
21	Vessel Traffic.....	7
23	Difficulties Attending Navigation.....	8
25	Water Power and Other Special Subjects.....	8
26	Plans of Improvement.....	8
31	Aids to Navigation.....	9
32	Shore Line Changes.....	9
35	Estimates of First Cost.....	10
37	Estimates of Annual Charges.....	11
38	Estimate of Benefits.....	13
51	Comparison of Benefits to Costs.....	17
52	Apportionment of Costs Among Interests.....	17
54	Proposed Local Cooperation.....	17
57	Coordination With Other Agencies.....	18
58	Discussion.....	18
72	Conclusions.....	22
76	Recommendation.....	23

CORPS OF ENGINEERS, U. S. ARMY  
OFFICE OF THE DIVISION ENGINEER  
NEW ENGLAND DIVISION  
150 CAUSEWAY STREET  
BOSTON 14, MASS.

NEDGW

9 May 1957

SUBJECT: Survey (Review of Reports) on Josias River, Ogunquit, Maine.

TO: The Chief of Engineers, Department of the Army, Washington,  
D. C.

AUTHORITY

1. This report is submitted in compliance with the following resolution, adopted February 17, 1949, by the Committee on Public Works of the House of Representatives:

"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, That the Board of Engineers for Rivers and Harbors be, and is hereby, requested to review the reports on Ogunquit-Perkins Cove, Maine, contained in House Document Numbered 227, Seventy-sixth Congress, First Session, with a view to determining if it is advisable to modify the existing project in any way, and particularly with a view to the construction of a breakwater."

2. A report of survey scope was authorized by the Chief of Engineers on March 23, 1949.

3. The report under review is designated as, "Survey of Ogunquit-Perkins Cove, Maine". The authorities for this report and the present review also refer to the locality under study by that name. The River and Harbor Act of March 2, 1945 which authorized the existing project, designates the locality as, "Josias River, Maine". For purposes of conformity with the name of the existing project, this review of reports designates the locality as "Josias River, Ogunquit, Maine".

SCOPE OF STUDY

4. In the preparation of this report, a detailed hydrographic survey consisting of soundings, probings, and sample borings was made, from which the character of the material and estimated quantities to be dredged were determined. Available maps, commercial statistics, and other data pertaining to the waterways have been studied. A public

hearing was held at Ogunquit Village, Maine on August 28, 1950, and information obtained therefrom is described under Improvement Desired. The information obtained from the public hearing has been further supplemented by recent contacts with local interests, particularly to determine whether there have been significant changes in their desires since the original hearing. All additions or changes in improvements requested subsequent to the public hearing are incorporated and considered in this report.

#### DESCRIPTION OF NAVIGATION CONDITIONS

5. Perkins Cove is a small indentation in the generally rocky Maine coast about 1 mile south of the center of Ogunquit and about 30 miles southwest of Portland, Maine. It measures about 350 feet in a north and south direction and about 430 feet in an east and west direction. Depths in the cove range from 25 feet at its outer entrance to 5 feet at the head of the cove where the mouth of the Josias River is situated. The Josias River formerly flowed into Oarweed Cove, a small cove north of and adjacent to Perkins Cove. About 50 years ago local interests dug a channel from Perkins Cove, where the local fleet was then based, into the Josias River and closed the channel into Oarweed Cove. This was done to enable the boat owners to bring their boats up the river more easily in times of storms and heavy wave action. The Josias River has been Federally improved to provide a channel 5 feet deep and 40 feet wide from Perkins Cove to Flat Pond, approximately 800 feet up the river. An anchorage basin covering an area of about 2.5 acres has also been dredged to a depth of 5 feet in Flat Pond. For about 300 feet above the basin, the Josias River flows across a small tidal marsh. The elevation of the marsh is about mean high water. The tidal portion of the river terminates at a small falls and rapids, located at the inner end of the marsh. The mean range of tide is 8.7 feet, the spring range 10.0 feet. The location is shown on the United States Coast and Geodetic Chart numbered 1205 and on the map accompanying this report.

#### TRIBUTARY AREA

6. The area contiguous to Perkins Cove and Josias River is occupied by the Ogunquit Village Corporation. The Corporation is a self-governing section of the town of Wells, established as such by a special act of the Maine Legislature in March 1913. There is no record of the permanent population of the village, but local authorities have advised that there are approximately 1000 permanent residents. The transient population in the summer is reported to be about 10,000 at any given time. The total real estate valuation of Ogunquit Village was about \$4,580,000 in 1953, of which about 40 per cent was summer residential property. The real estate valuation of the village represented about 45 per cent of the total real estate valuation of the town of Wells. There are no important industries in the village, the

A T L A N T I C

O C E A N

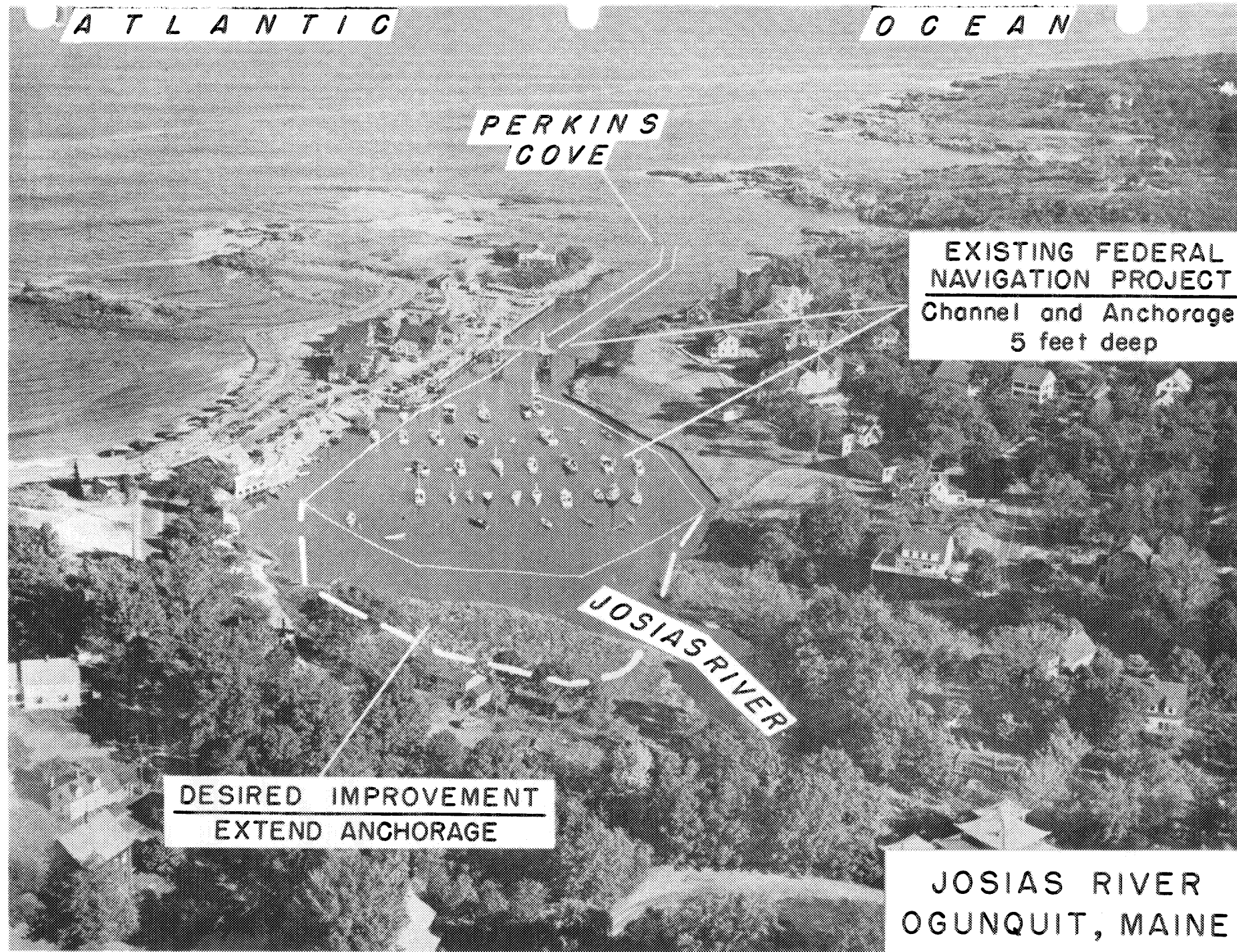
PERKINS  
COVE

EXISTING FEDERAL  
NAVIGATION PROJECT  
Channel and Anchorage  
5 feet deep

JOSIAS RIVER

DESIRED IMPROVEMENT  
EXTEND ANCHORAGE

JOSIAS RIVER  
OGUNQUIT, MAINE



principal occupations of the permanent residents being those associated with the summer recreational business and the fishing industry. Numerous small farms are also scattered throughout the area. There are no rail-road connections to the village, the nearest being 6 miles distant. The area is served by various motor truck common carriers over U. S. Highway Route No. 1 which passes through the town.

#### BRIDGES

7. There is one bridge over the Josias River in the area considered in this report. It is a wooden foot-bridge, owned by the Ogunquit Village Corporation and located about 550 feet above the mouth of the river. It has a hand operated draw span with a horizontal clearance of 43 feet and, when closed, a vertical clearance of 24 feet. The bridge was altered in 1942, when the draw span was added to an existing fixed bridge. No Federal permit has been issued for the construction of a bridge in this location.

#### PRIOR REPORTS

8. There have been three previous reports regarding improvements in the Josias River, including the report under review. Pertinent data on these reports is summarized in the following tabulation.

Published In	Nature and Date of Report	Work Considered and Recommendation
House Document No. 419, 62nd Congress, 2nd Session	Preliminary Examination 1911	Construction of a breakwater and some dredging.-Unfavorable
Not Published	Preliminary Examination 1930	Dredging of channel 40 feet wide and 3 feet deep at mean low water from Perkins Cove to Flat Pond.-Unfavorable.
House Document No. 227, 76th Congress, 1st Session	Preliminary Examination and Survey 1935 and 1938	Dredging of an anchor- age basin about 3 acres in area and 5 feet deep at low water in Flat Pond, and a connecting channel 5 feet deep at mean low water and 40 feet wide through Josias River to Perkins Cove.- Favorable

The most recent of these is the report under review and is the basis of the existing project.

### EXISTING CORPS OF ENGINEERS PROJECT

9. The existing project for the improvement of Josias River, Ogunquit, Maine was authorized by the River and Harbor Act of March 2, 1945 and comprises the project recommended in the reports published as House Document 227, 76th Congress, 1st Session. The existing project provides for a channel 5 feet deep and 40 feet wide in the Josias River from that depth in Perkins Cove to and including an anchorage basin in Flat Pond of the same depth and about 2.5 acres in area. The project was completed in 1951. The cost to the United States to date for new work under the existing project has been \$30,658. The latest approved estimate for maintenance is \$1,800 annually. There have been no maintenance costs to date.

### LOCAL COOPERATION ON EXISTING PROJECT

10. The requirements for local cooperation are contained in House Document No. 227, 76th Congress, 1st Session. These requirements were modified by the River and Harbor Act of March 2, 1945. Conditions of local cooperation set forth in the House Document state that;

"local interests furnish free of cost to the United States all land, easements, and rights-of way, and spoil-disposal areas for the initial work and for subsequent maintenance as required; hold and save the United States free from claims for damages resulting from the improvements; make alteration to the existing footbridge across Josias River as may be required by the Secretary of War; provide suitable landing facilities open to all on equal terms; and contribute one half of the initial cost of the improvement, but not to exceed \$32,000."

The River and Harbor Act adopted the project in accordance with the House Document,

"except that the useful work done on the project by local interests shall be accepted toward the fulfillment of the requirement of local cooperation."

11. The provisions of the House Document were modified by the River and Harbor Act to allow local interests to receive credit for work accomplished toward the project subsequent to the preparation of the reports contained in the document. Prior to the adoption of the project by Congress, the Ogunquit Village Corporation spent \$35,000.00



toward the accomplishment of the project substantially in accordance with Government plans. The village also altered the bridge by addition of a draw span.

#### OTHER IMPROVEMENTS

12. About 50 years ago local interests changed the course of the Josias River to flow into Perkins Cove instead of Oarweed Cove into which it then flowed. In 1941 local interests deepened the channel and dredged an anchorage in the wide part of the river, about 800 feet from the entrance. The Ogunquit Village Corporation has constructed two pile and timber bulkheads backed with earth fill, one on the northeasterly shore of the river, and one on the southwesterly shore of Flat Pond. The Corporation has also constructed all terminal facilities located in the anchorage, and includes \$1,500 annually in its budget for harbor maintenance as well as additional sums from time to time.

#### TERMINAL FACILITIES

13. There are four wharves in the harbor, all owned by the Ogunquit Village Corporation and open to the public free of charge. Three of these wharves are located in Flat Pond and one in Josias River between Flat Pond and Perkins Cove. The Village Corporation has also erected a pile and timber bulkhead backed with earth fill, on the northerly shore of the river. The easterly end of this bulkhead is about 300 feet below the footbridge from which point it extends about 490 feet along the northerly bank of the river into Flat Pond. A marine railway capable of handling boats up to 50 feet in length is located immediately east of the bulkhead.

14. One of the town wharves is located just below the footbridge. It consists of a float, 20 feet long by 8 feet wide, connected to the bulkhead by means of a movable ramp. The next wharf upstream, located about 100' above the bridge, is a 30-foot long by 8-foot wide platform projecting from the bulkhead. Three landing floats, 8 feet wide by 30 feet long, are placed in tandem just above this wharf and a 1-ton electric hoist is located on the wharf itself. Facilities for servicing boats with fuel and water have been placed on this wharf. In Flat Pond, about 300 feet above the bridge on the northerly shore, there is an open pile and timber wharf 10 feet wide and 30 feet long. About 40 feet above this latter wharf there is another pile and timber wharf. This wharf is about 8 feet wide and 20 feet long. It has no mechanical handling facilities and its dock is dry at mean low water.

15. Craft in the anchorage are moored fore and aft to an 80 pound ball attached to a one inch anchor chain that is laid across the bottom. There are six such chains to provide moorings for 5 rows of boats, accommodating a total of about 50 boats. In the summer, the boats are doubled at the moorings, with about 80 boats being accommodated regularly

and as many as 100 on occasion. The Ogunquit Village Corporation maintains all moorings, the marine railway, storage space, roads, bulkheads, docks, and the bridge, and pays for breaking ice in the harbor during the winter. All terminal facilities and moorings are open to all on an equal basis.

#### IMPROVEMENT DESIRED

16. A public hearing, held at Ogunquit Village on August 28, 1950, was attended by numerous interested persons, including officials of State and local governments, the Perkins Cove Harbor Committee, fishermen, and summer residents. The hearing was held in order to ascertain the views of local interests as to the extent and necessity of improvements in the harbor.

17. Proponents of the improvement requested two modifications of the existing project: first, the construction of a breakwater, to be located on the northerly side of Perkins Cove, extending 350 feet in a southeasterly direction from the southeast side of Adams Island to the ledge pinnacles on the north side of Perkins Cove, and second, dredging of the marsh area at the westerly end of the basin to a depth of 5 feet. to provide additional anchorage area of about one acre.

18. The breakwater was requested primarily to lessen the effects of northeasterly and easterly storms. It was claimed that entrance to the river is impossible during these storms and for 2 to 3 days afterward. This is caused by heavy seas which break over the ledge pinnacles on the north side of the cove creating a turbulence at the entrance. The opinion was also expressed that a breakwater might eliminate a wave action that sometimes occurs in the Flat Pond anchorage. On occasion, on a high tide, a good sized wave runs up the channel, through the anchorage, and breaks near the cottages at the westerly end. From time to time this wave action has caused some property and boat damage. In this connection, in a recent conference local interests reported that during the winter of 1955-56, the town float was damaged when it reached the upper limit of its travellers, and one of the mooring chains was moved about 20 feet out of place.

19. The extension of the anchorage basin was requested in order to allow accommodation of a greater number of boats. In recent contacts, local interests have stated that the Ogunquit Village Corporation has had to refuse requests for moorings from both fishing and recreational craft, and from prospective owners, because of lack of available anchorage area. At a recent conference local interests indicated that they now considered the need for additional anchorage area substantially more necessary than the originally desired breakwater protection.

## COMMERCE

20. Commerce in the Josias River consists entirely of fishing commerce. Although no wholly reliable statistics are available, reasonable evidence indicates that the annual lobster catch landed in the harbor has averaged about 200 tons during the past five years. Available records from one seiner operating from the cove from 1951 through 1955 indicate a catch of mackerel, menhaden, and herring ranging from a minimum of about 400 tons in 1951 to a maximum of 800 tons in 1954. Three such seiners based in the anchorage from 1951 through 1954, and one continued to base there in 1955. It appears that much of the catch of these fishing craft was landed at other fishing ports along the coast of Maine. All seiners have now left the anchorage because of lack of adequate space. The annual catch of tuna and mackerel is locally estimated at 1,000 tons. In addition to the fishing commerce in the harbor, a fleet of 11 party boats based in the anchorage carries an estimated 10,000 passengers annually.

## VESSEL TRAFFIC

21. Although no vessel trip statistics are available for Josias River, Ogunquit, Maine, accurate reports on the size of the present fleet based in the anchorage have been obtained. The fleet now based in the Flat Pond anchorage comprises the following types and numbers of craft.

<u>Type of Boat</u>	<u>Number based year round</u>	<u>Number based summer only</u>
Lobster boats	19	6
Commercial tuna boats (2 men)		10 (1)
Commercial mackerel boats (6 men)		3 (1)
Party boats	11 (2)	3
Recreational boats	<u>17</u>	<u>10 (3)</u>
	47	32

- (1) These boats work from Ogunquit-Perkins Cove 2 to 4 weeks during the Spring and 4 to 6 weeks during the Fall.
- (2) During the winter 1 of these boats is used as a dragger, and the remaining 10 are used as lobster boats.
- (3) This figure is taken as the average number of transient craft in the harbor during the season. The majority of transient recreational craft visit the harbor for stays of about one week.

22. The party boats permanently based in the Flat Pond anchorage in Josias River consist of 5 boats which carry 4 passengers per trip for rod and reel fishing; 1 boat which carries an average of 15 passengers per day for hand line fishing; 4 boats used as excursion boats and operating hourly carrying 4 to 10 passengers; and one, the "Down Easter", which makes 2 trips daily carrying up to 30 passengers per trip.

### DIFFICULTIES ATTENDING NAVIGATION

23. Perkins Cove, the entrance to Josias River, is entirely exposed to winds originating from northeasterly through southeasterly directions. Storms from the northeast are of the highest velocity occurring in the locality. These storms produce heavy seas which break over the ledge pinnacles on the northerly side of the cove, creating a turbulence at the entrance to the Josias River. Navigation of the cove and entrance is impossible during storm periods and hazardous from one to two days after the storm due to the heavy swells that usually persist after the storm has abated. Storms from southeasterly directions are usually of shorter duration, less frequency, and lower wind velocity, resulting in lighter seas and smaller swells.

24. During periods of heavy seas and swells, at high tide, a good sized wave sometimes runs up the channel, through the anchorage, and breaks at the westerly end of the basin. The height of such waves is locally estimated at from 2 to 4 feet at the bridge, decreasing to about 1 foot at the westerly end of the basin.

### WATER POWER AND OTHER SPECIAL SUBJECTS

25. The waterway is tidal. Matters of water power or flood control are not pertinent to this report. The proposed improvement would have no adverse effect on shellfish or wildlife.

### PLANS OF IMPROVEMENT

26. Three plans of improvement for the Josias River, Ogunquit, Maine, have been considered, as follows: (1) a breakwater as proposed originally by local interests; (2) a system of two breakwaters; and (3) additional anchorage area in Flat Pond approximately as proposed by local interests.

27. The breakwater based on the proposal of local interests would be constructed on the ledge ridge which extends southeasterly from the southeast side of Adams Island to the ledge pinnacles on the north side of Perkins Cove, a distance of about 350 feet. The breakwater considered would have a top width of 10 feet at an elevation of 15 feet above mean low water, 6.3 feet above mean high water, and 5.0 feet above the spring tides predicted in the vicinity of Ogunquit. Side slopes would be 1 on 1.5. Although such a structure would reduce to some extent the turbulence created by storm waves at the entrance to the Josias River, increasing slightly the number of days during which the entrance was passable, studies indicate that the beneficial effects would be small. Available data provides no firm evidence that such a breakwater would significantly reduce wave action which local interests describe as occurring at times within the Flat Pond anchorage.

28. An alternative plan for a system of breakwaters was considered. This system would consist of one breakwater extending about 525 feet southeasterly from the northerly side of Perkins Cove, and a second breakwater extending about 150 feet northerly from the southerly side of the cove, both with a top elevation of 15 feet above mean low water. Studies indicate that such a system of breakwaters would reduce the turbulence at the entrance to the river. In addition, these structures would provide a protected anchorage area of approximately 3.0 acres in Perkins Cove.

29. The plan for the additional anchorage area within the existing basin was based upon consultation with local interests, and would provide approximately one acre of additional mooring space. The area comprises, for the most part, the remainder of the marsh which was partially removed in constructing the existing basin. Although probings indicate the presence of a relatively high percentage of ledge in the area to be dredged, it is impracticable to expand the anchorage significantly in any other direction. The entire area proposed for dredging lies within the property lines of the Ogunquit Village Corporation.

30. In recent consultation, local interests have indicated that they do not now believe the effects of the breakwater originally proposed would justify its construction. Local interests have further expressed the opinion that although both the entrance protection and the additional anchorage area provided by the proposed system of breakwaters would be highly desirable, the relatively high cost of local contribution would be greater than the Ogunquit Village Corporation could reasonably be expected to assume at this time. Local interests have emphasized that they now believe their greatest need to be for additional anchorage area and have expressed the opinion that the most desirable additional area at this time would be in the Flat Pond anchorage.

#### AIDS TO NAVIGATION

31. The United States Coast Guard has been consulted on the matter of aids to navigation and has advised that one daybeacon on the single breakwater initially proposed, one lighted bell buoy, and 2 reflector installations on the existing buoys would be required. The estimated cost of the installations amounts to \$10,000.00 with \$1,000.00 for annual maintenance.

#### SHORE LINE CHANGES

32. The Josias River reaches the ocean at a small indentation in a generally bare ledge coastline. Within this indentation are two ledge outcroppings. A narrow barrier beach extends southeasterly from the northerly shore of the mainland to the inner end of the smaller outcrop and thence to the larger and most southerly of the two outcrops. This beach and the large ledge outcrop divides the indentation into two coves, Perkins Cove on the south and Carweed Cove on the north. The Josias River flows in back of the barrier beach and into Perkins Cove. The barrier

has been increased in width through the disposition of materials dredged from Josias River and its seaward face in Oarweed Cove is divided into two pockets by the two ledges which extend perpendicularly from the shore. The shore of Perkins Cove is bare ledge. Between Ogunquit Beach, about one mile north of Perkins Cove, and York Beach about 5 miles to the south, there are a few small, narrow pocket beaches between the ledge outcroppings but there are no extensive sandy beaches.

33. The location of the proposed single breakwater is the crest of a ledge ridge which extends southeasterly from the north side of Perkins Cove and is exposed at low water. Increasing the height of this ridge will not affect the ledge shore of Perkins Cove or have any effect upon the shoreline north and south of the cove. The lack of extensive beaches in the immediate vicinity does not indicate that any appreciable amount of material is drifting along the shore. Since the dominant winds which act upon the shore are from the north and northeast, the dominant direction of littoral drift is north to south and material would probably be deposited in Oarweed Cove before reaching the proposed breakwater location. The configuration of Oarweed Cove is such that material moving from the north may be expected to be retained between the ledges which act as natural groins. Therefore, it is not considered that the proposed breakwater would trap any appreciable amount of material or build out the immediate shore. Similarly, it is not considered that the considered system of breakwaters would significantly affect the shoreline.

34. The proposed extension of the anchorage basin would remove most of the remaining marsh to a depth of 5 feet. It is not considered that this relatively shallow depth will be sufficient to have any effect upon the developed shoreline except for minor changes which may occur immediately after the dredging is accomplished. This shore is the property of the Ogunquit Village Corporation.

#### ESTIMATES OF FIRST COST

35. Estimates of first cost have been prepared for the considered system of breakwaters and for the proposed anchorage extension in Flat Pond. Since the effect of the proposed single breakwater is considered to be negligible, no estimate of first cost therefor has been prepared.

36. Quantities estimated for dredging are for materials in place with an allowance for 1 foot of overdepth. The unit price for dredging is based on the materials being removed by dipper dredge and disposed at sea. The unit price is also based on the nature and small amount of material involved. Previous dredging in the harbor and probings from surveys have indicated the presence of large boulders or ledge in the area involved in the basin extension, and an estimate of the quantity of such material has been made. Quantities for breakwater construction include allowance for voids and tolerances. Unit prices are based on

prices prevailing in March, 1957, and on removal of material by contract dredging. The cost of aids to navigation were furnished by the United States Coast Guard. The estimates of first costs are as follows:

#### ANCHORAGE EXTENSION

##### Project Construction

Dredging 28,000 cubic yards of ordinary material at \$2.50 per cubic yard.....	\$ 70,000
Removal of 4000 cubic yards of ledge at \$50 per cubic yard.....	200,000
	<u>270,000</u>
Contingencies.....	40,000
Engineering and Design.....	10,000
Supervision and Administration.....	20,000
Total Project Construction Cost.....	<u>\$340,000</u>
(March 1957)	

#### BREAKWATER SYSTEM

##### Project Construction

35,000 tons of rock at about \$11.50 per ton.....	\$400,000
Contingencies.....	40,000
Engineering and Design.....	5,000
Supervision and Administration.....	30,000
Total Project Construction Cost.....	<u>\$475,000</u>
Aids to Navigation.....	10,000
Total Project Cost (March 1957).....	<u>\$485,000</u>

#### ESTIMATES OF ANNUAL CHARGES

37. The estimated annual carrying charges have been computed on an assumed project life of 50 years and at an interest rate of 2.5 percent on both Federal and non-Federal public investment. The annual charges for the anchorage have been computed on the basis that local interests will contribute in cash a portion of the cost of the improvement, the total costs to be borne by local interests to be 25 per cent of the total estimated project cost, which is commensurate with that portion of the benefits which are local in nature.

#### ANCHORAGE EXTENSION

##### INVESTMENT

##### Federal Investment

Construction cost: Corps of Engineers.....	\$255,000
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##### Non-Federal Investment

Construction cost: Local interests.....	85,000
Total Investment (March 1957).....	<u>\$340,000</u>

ESTIMATED ANNUAL CHARGES

	<u>Corps of Engineers</u>	<u>Local Interests</u>	<u>Total</u>
Interest on investment	\$6,400	\$2,100	\$8,500
Amortization	2,600	900	3,500
Maintenance	500		500
Totals	<u>\$9,500</u>	<u>\$3,000</u>	<u>\$12,500</u>

BREAKWATER SYSTEM

INVESTMENT

Project construction cost.....	\$475,000
Aids to Navigation.....	10,000
Total Project Cost (March 1957).....	<u>\$485,000</u>

ESTIMATED ANNUAL CHARGES

Corps of Engineers	
Interest on investment.....	\$ 11,900
Amortization.....	4,900
Maintenance.....	2,500
Total Corps of Engineers.....	<u>\$ 19,300</u>
Coast Guard	
Interest on investment.....	\$ 250
Amortization.....	100
Maintenance.....	1,000
Total Coast Guard.....	<u>\$ 1,350</u>
Total Estimated Annual Charges.....	<u>\$ 20,650</u>



### ESTIMATES OF BENEFITS

38. The plans of improvement considered for the Josias River, were designed to provide protection from storm waves and to provide additional anchorage in the existing basin. Inasmuch as it is considered that the single breakwater originally proposed by local interests would provide neither significant protection nor increased anchorage area, no benefits therefor have been estimated. Further, in view of the fact that local interests have indicated that the extent of local cooperation which would necessarily be required for the proposed system of breakwaters could not reasonably be expected at this time, no benefits have been specifically estimated for this plan of improvement. However, the primary benefit that would result from the breakwater system would be additional anchorage space, the benefits similar to those estimated in the following paragraphs for additional anchorage space in the upper harbor.

39. The benefits to be derived from the extension of the existing Flat Pond anchorage basin would accrue from increases in fishing and recreational boat activities, the former being considered entirely general in nature and the latter partly general and partly local. Approximately 50 boats are now permanently based in the existing anchorage which is about 2.5 acres in area; and in the summer this number is increased to between 70 and 80. Local interests report that nearly 100 have on occasion been moored in the basin under their present system of fore and aft mooring. Although such a system must necessarily result in considerable crowding, with consequent delays to boat owners, local interests indicate that owners do not consider themselves seriously inconvenienced, and that benefits potentially accruing from the alleviation of overcrowding are locally considered negligible compared to benefits potentially accruing from the provision of space for expansion of the existing fleets. It is reported that it is repeatedly necessary to refuse requests for moorings from additional boat owners and from prospective new boat owners because of lack of space.

40. With respect to damage to boats resulting from overcrowding, local interests report that existing methods of mooring, coupled with care exercised by those in charge of harbor operations, minimize vessel damage. They cite the fact that recent New England hurricanes have resulted in no significant damage to craft in the anchorage. Although this is partly attributable to the highly sheltered nature of the anchorage, local interests state that mooring methods coupled with the use of a cat's cradle of lines to hold the boats was primarily responsible for avoiding damage. The claims of local interests as to the effectiveness of present mooring methods are considered valid.

41. In view of these facts, benefits accruing from the expansion of the existing basin will result entirely from the expansion of the existing fishing and recreational fleets, rather than from any increases

in the use of the existing fleets, or reduction of damage thereto. The sheltered nature of the anchorage, its accessibility to good fishing grounds and to plentiful supplies of lobster, the highly developed recreational nature of the tributary area, and the concrete evidence of requests for additional mooring space indicate that substantial expansion may be expected if increased anchorage is provided.

42. At the present time 19 lobster boats are permanently based in the Josias River anchorage. Of these, 15 operate full time and bring in an estimated 15,000 pounds of lobster annually per boat; the remaining 4 operate only part time. In addition to these permanently based craft, 16 other boats operate part time as lobster boats, 6 of these being based in the anchorage during the summer, and 10 of them being boats used as party boats during the summer and lobster boats during the winter. Although the lobster catch for a part time boat varies widely, it is estimated that it averages about 75 pounds per daily trip. The total fleet of lobster boats operating full and part time from the anchorage has increased from 24 to 35 since 1950, the number operating full time having increased from 9 to 15.

43. It is estimated that if additional anchorage was provided, an average of at least 3 new full time and 2 new part time lobster boats would be added to the fleet over the life of the project. Since it is reasonable to assume 200 fishing days per year in this vicinity for a full time boat, with an average daily catch of about 75 pounds, the three new full time boats would catch a total of 45,000 pounds annually. It is estimated that each part time boat added to the fleet would average 80 fishing days per year, resulting in a total gain of 12,000 pounds annually for the 2 new part time boats. The estimated increase in lobster catch for the fleet, if additional anchorage area were provided, is 57,000 pounds annually. This represents a little less than a 15 percent increase in the present catch. This is considered reasonable in view of the anticipated 15 percent average increase of the population of New England over the life of the project. Since the average value of lobster catch in this vicinity is now about \$0.38 per pound, the total value of the increased lobster catch accruing from the proposed improvement is estimated at \$21,600, of which about 60 percent (\$13,000) is the additional cost to trap and land the lobsters. The net annual benefit from the improvement is thus estimated to be \$8,600 and is considered to be entirely general in nature.

44. In addition to the lobster fleet based in Josias River, from 1 to 3 seiners have operated from the harbor at various times, and during the past two years 10 commercial tuna boats and 3 commercial mackerel boats have based there for a total of about 8 weeks during the spring and fall. The total catch of this fleet is estimated to have varied from about 400 to 2,300 tons for seiners, and is estimated to average 1,000 tons for outside tuna and mackerel boats. Seinners previously

based in the anchorage have now transferred to other harbors. The nearness of the anchorage to fishing grounds located 1 to 10 miles offshore is sufficiently attractive to ground fishermen so that the provision of increased anchorage area would very likely result in the transfer of 1 or more seiners back to the harbor, and might result in the temporary basing of additional tuna and mackerel boats therein. There are no fish processing plants at Ogunquit, however, and the bulk of the catch of ground fishing craft based in the harbor appears to be landed elsewhere. It is considered, therefore, that any transfer of ground fishing craft which might occur as the result of improvement would be only for temporary periods of favorable fishing, and that no increase in the total national catch would result as a consequence of the improvement. Although some savings in time might accrue from the basing of craft closer to fishing grounds, these savings would be unpredictably periodic rather than regular and are not considered susceptible of any firm evaluation.

45. The existing permanent fleet of party and sport fishing boats consists of 11 craft varying in length from 34 to 50 feet, 6 of these being engaged in sport fishing, and 5 carrying excursion parties. In addition, 3 other party boats base in the anchorage during the summer. These are all considered to constitute a portion of the recreational fleet.

46. The existing private recreational fleet consists of 17 craft basing in the anchorage throughout the year, and transient craft averaging at least 10 continuously through the summer. Available data indicates that this represents an increase of 10 craft in the permanent fleet since 1950, and an approximate doubling of the numbers of transient craft using the harbor. It will be noted that the combined fleet of party boats and private recreational craft totals 28 craft permanently based in the anchorage, and the equivalent of 13 additional craft based there during the recreational seasons.

47. This total fleet is composed of cruisers, auxiliary sailboats, and inboards, varying from 18 to 50 feet in length, and is estimated to have a total present value of about \$125,000. Although no benefits are expected to accrue to this fleet from the proposed improvement, the nature and character of the fleet is taken as a reasonable basis for the composition of the anticipated fleet expansion.

48. The proposed anchorage extension is equal to about 1 additional acre, or about a 40 percent increase in the size of the present 2.5 acre basin. A total of about 50 craft are permanently based in the present area, from 70 to 80 during the summer, and on occasion, up to 100. Since local interests expect to extend their present mooring system if the proposed improvement is provided, it is considered that the additional area proposed will accommodate 20-40 additional new craft. Evidence of past growth of the fleet and of the demand for additional moorings indicates that an average expansion of the recreational fleet equal to this

capacity will occur over the life of the project. It has been estimated that 5 additional fishing craft will be added to the fishing fleet. It is considered, therefore, that the remaining capacity will be utilized by the expansion of the recreational fleet through the purchase of 15 new boats.

49. It is considered that such expansion will be in types consistent with those now using the harbor, and will consist of cruisers, auxiliary sailboats, and inboards. The estimated for hire return on these craft is considered to be a benefit accruing to the proposed improvement. The estimated number of new boats which will be added to the fleet as a result of the proposed improvement, together with the estimated annual return on a for hire basis, is as follows:

<u>Type of Craft</u>	<u>Length</u>	<u>Estimated Number</u>	<u>Total Depreciated Value</u>	<u>Percentage Return</u>	<u>Annual Net Return</u>
Cruisers	25-40	4	\$36,000	9	\$3,200
Auxiliary Sailboats	25-40	4	36,000	9	3,200
Inboards	30-35	<u>7</u>	<u>14,000</u>	10	<u>1,400</u>
		15	\$86,000		\$7,800

Inasmuch as these boats would realize the entire benefits possible from such craft, the benefit accruing to such boats from the proposed improvement is considered to be equivalent to the entire annual net return of \$7,800. This benefit is considered to be 50 percent general and 50 percent local.

50. The tangible benefits estimated to accrue from the proposed improvement of Josias River may be summarized as follows:

<u>Source of Benefit</u>	<u>Amount General</u>	<u>Amount Local</u>	<u>Total</u>
Increase in lobster catch	\$8,600		\$8,600
Expansion of permanent and transient recreational fleet	<u>3,900</u>	<u>\$3,900</u>	<u>7,800</u>
	\$12,500	\$3,900	\$16,400

### COMPARISON OF BENEFITS TO COSTS

51. A comparison of the estimated annual benefits, evaluated as \$16,400, and the estimated annual carrying charges of \$12,500 results in a benefit-cost ratio of 1.3 to 1.0 for the anchorage extension.

### APPORTIONMENT OF COSTS AMONG INTERESTS

52. Local interests should bear a portion of the cost of the improvement commensurate with the local benefits to be derived from the improvement. The apportionment of costs between the United States and local interests is therefore made so that the Federal and non-Federal annual carrying charges bear approximately the same ratio as evaluated general and local benefits. The apportionment of costs is as follows for the anchorage extension:

<u>Type</u>	<u>Evaluated Benefits</u>		<u>Agency</u>	<u>Annual Charges</u>	
	<u>Amount</u>	<u>Percent of Total</u>		<u>Amount</u>	<u>Percent of Total</u>
General	\$12,500	76%	Corps of Engineers	\$9,500	76%
Local	<u>3,900</u>	24%	Local Interests	<u>3,000</u>	24%
	\$16,400			\$12,500	

53. The annual charge applicable to local interests on the basis of a 50 year life for the project and an interest rate of 2.5 percent represents an initial investment of \$85,000, or 25 percent of the first cost (\$340,000) of the anchorage extension. Therefore, local interests should contribute 25 percent of the project construction cost.

### PROPOSED LOCAL COOPERATION

54. The benefits to be derived from the proposed expansion of the anchorage in Josias River are in part general and in part local, those accruing to fishing commerce being entirely general, and those accruing to recreational craft being 50 percent local and 50 percent general. It is considered, therefore, that local interests should bear a proportionate share of the costs of construction. The apportionment of costs between the United States and local interests, based on the relative benefits applied to annual charges, requires that local interests make a cash contribution of 25 percent of the total investment costs. The local cash contribution is presently estimated at \$85,000.

55. Local interests should also be required to agree to hold and save the United States free from damages due to construction and maintenance of the improvement, and to provide without cost to the United States all lands, easements, and rights of way necessary for the construction of the project, and for the subsequent maintenance thereof. In view of the nature of the material to be dredged, it is improbable that the anchorage extension could be satisfactorily undertaken by hydraulic dredge. Therefore, local interests should not be required to furnish spoil disposal areas.

56. The Ogunquit Village Corporation voted on December 17, 1956 to meet the above requirements of local cooperation.

#### COORDINATION WITH OTHER AGENCIES

57. All Federal, State, and local agencies having interest in the development and use of waterways were notified of the public hearing held at Ogunquit, Maine, August 28, 1950, on the proposed improvement. All agencies that expressed interest in the harbor were in favor of the desired improvement. Subsequent to the plan of improvement proposed herein, local interests have been consulted and have expressed general agreement with the plan for the extension of the anchorage.

#### DISCUSSION

58. The Josias River is a small, partly tidal river, which empties into Perkins Cove about 30 miles southwest of Portland, Maine. About 50 years ago local interests changed the course of the river to flow into Perkins Cove instead of Oarweed Cove into which it then flowed. This was done to enable fishermen, who then based in Perkins Cove, to seek refuge more readily in the river from northeasterly and easterly storms. In 1941, local interests deepened the channel and dredged an anchorage in a wide part of the river, about 800 feet from the entrance.

59. The existing Corps of Engineers project was authorized by the River and Harbor Act of 1945. It provides for a channel 5 feet deep in the river and an anchorage of the same depth and about 2.5 acres in area about 800 feet upriver from the entrance. This project was completed in June 1951.

60. The area immediately tributary to Josias River is occupied by the Ogunquit Village Corporation, a self-governing section of the Town of Wells, with a permanent population of about 1,000 and a real estate evaluation of about \$4,500,000. The principal occupations of the inhabitants are those associated with the summer recreational business and the fishing industry. It is reported that during the summer recreational season, the transient population is about 10,000 at any given time. About 40 percent of the real estate evaluation is for summer residential property.

61. The river and anchorage is used extensively by both local and transient craft, by numerous party boats, and by a substantial fleet of lobster boats. In addition, ground fishing craft including seiners, commercial tuna boats, and commercial mackerel boats make use of the harbor at intervals. The use of the harbor has increased continuously since the completion of the existing project in 1951 until the combined fleets using the anchorage total about 50 craft the year round, and an additional 20 to 30 craft during the summer season. Local interests report that requests for additional moorings, both from present and prospective boat owners, have been denied for lack of further space in the anchorage. The importance of the anchorage to local interests is testified to by a long history of local improvement, by the construction of bulkheads and of terminal facilities open to all on an equal basis, by cash contribution to the existing Federal project, and by an annual appropriation of \$1,500 for the maintenance and efficient operation of facilities in the anchorage, as well as additional special appropriations when necessary. Local interests have also developed a mooring system which permits an unusual density of craft in the existing 2.5 acre anchorage with a minimum of inconvenience and boat damage, even in severe storms.

62. At a public hearing held in Ogunquit Village on August 28, 1950, local interests expressed a desire for the construction of a breakwater about 350 feet long on the northerly side of Perkins Cove in order to lessen the effects of northeasterly and easterly storms which make entrance to the river impossible not only during the storms but frequently for some time afterwards, since heavy seas break over the ledge pinnacles on the north side of the cove, creating a turbulence at the entrance. Local interests also expressed the opinion that such a structure would eliminate or lessen the effects of waves which occasionally travel up the river and through the anchorage. In addition, local interests expressed a desire for the extension of the existing anchorage basin in Flat Pond by dredging the remainder of the marsh which was partially removed in constructing the existing basin.

63. Subsequent studies indicated that the breakwater proposed by local interests would have only slight effect in reducing turbulence at the entrance caused by storm waves. Studies further provided no clear evidence that such a structure would eliminate or reduce the occasional wave action in the river which local interests described. An alternative plan was considered consisting of a system of two breakwaters, one extending about 525 feet from the northerly side of Perkins Cove, and the other extending about 150 feet from the southerly side of the cove. Such a system would provide substantial protection and at the same time would create about 3 acres of additional sheltered anchorage area. In view of the high cost of such a system of structures and the limited though real needs for expanded anchorage area in the waterway, detailed studies of such a system were not made. Further, local interests indicated in consultation that the relatively heavy local cooperation which would necessarily be required for such a system of structures could not reasonably be expected at this time. Therefore, no detailed estimates

of benefits accruing to this plan have been made in this study. However, the benefits would be similar in nature and magnitude to those that would accrue to the inner extension of the anchorage.

64. The proposed extension of the existing anchorage basin to provide an additional anchorage area of about one acre would result in benefits accruing from the expansion of the existing lobster fleet, and the existing recreational fleets both permanent and transient. It is not expected that any benefits will accrue to the improvement through the alleviation of crowded conditions, inasmuch as local interests indicate that present boat owners express no dissatisfaction with existing methods of mooring. Local interests are of the opinion that any additional mooring area provided will be quickly used in the same fashion as the existing mooring space. The highly developed recreational nature of the tributary area, the accessibility of the harbor to plentiful supplies of lobster and ground fish, and its relatively protected character, together with the history of rapid growth of the existing fleets during recent years testifies to the high probability that the proposed anchorage expansion will be used to capacity within a relatively brief time.

65. At the present time, the size of the combined fleets mooring in the existing 2.5 acre anchorage varies from about 50 craft during the entire year to an average of about 70 during the summer months. Since the proposed extension of the anchorage by approximately 1.0 acre represents an expansion approximating 40 percent in mooring space, and since it is considered that this space will be used to capacity, it is estimated that an average of 20 additional craft will be added to the existing fleet as a result of the proposed expansion. Of these 20 craft, it is estimated that 5 will be lobster boats and 15 new recreational craft. Although the expansion of the existing anchorage may result in the use of the mooring area by some additional seiners or other commercial ground fishing craft from time to time, it is not considered that such use of the waterway will increase the total national fish catch, nor serve as more than a periodic and temporary convenience to fishing craft. No benefits are considered to accrue from such potential transient fleet expansion.

66. It is estimated that all of the 5 additional fishing craft added to the existing fleet as a result of the proposed expansion will be lobster boats, and that of these, 3 will operate full time, and the remaining 2 will operate part time. The average catch of a full time lobster boat in the vicinity is estimated at 15,000 pounds per year; the average catch of the majority of part time lobster boats is estimated at 6,000 pounds per year. The total annual additional lobster catch is, therefore, estimated at 57,000 pounds. Since the value per pound of lobster in the area is considered to be \$0.38, the total value of



the additional lobster catch is estimated at \$21,600, including \$13,000 in operating expenses. The net benefit of \$8,600 accruing to the proposed improvement is considered to be all general in nature.

67. It is considered that the proposed anchorage extension will be utilized by 15 new craft in the permanent recreational fleet. On the basis of the type and value of craft in the existing recreational fleet, it is estimated that these new craft will be cruisers, auxiliary sailboats, and inboards of somewhat more than average value. It is estimated that additional recreational craft will consist of 4 cruisers with a total depreciated value of \$36,000; 4 auxiliary sailboats with a total depreciated value of \$36,000; and 7 inboards with a total depreciated value of \$14,000. The evaluated benefits accruing to such a fleet, estimated on a for-hire basis, total \$7,800. Since these craft will realize the full benefits possible from such craft, the benefits accruing to this fleet from the proposed improvement are considered to be equivalent to the entire annual net return of \$7,800. These benefits are considered to be 50 percent general and 50 percent local in nature.

68. Consideration of the various types of craft using the Josias River anchorage, the potential use of the anchorage in the future, and the needs of small craft navigation in the area, result in the conclusion that a plan providing additional anchorage area of about 1 acre with a depth of 5 feet is a desirable plan for serving the present and future foreseeable needs of navigation in the immediate area. Such an additional anchorage area can be provided within the property lines of the Ogunquit Village Corporation.

69. The improvement of Josias River, Ogunquit by providing additional anchorage area of about 1 acre with a depth of 5 feet can be accomplished at an estimated project cost of \$340,000, the relatively high cost being consequent upon the need for ledge removal within the only area in which the existing anchorage can be extended. The total estimated annual carrying charges of \$12,500, and the evaluated benefits of \$16,400, result in a favorable benefit cost ratio of 1.3 to 1.

70. Local interests should bear a portion of the total construction costs of the improvement proportionate to the local benefits to be realized from the improvement. An equitable apportionment of costs is made herein so that non-Federal annual carrying charges bear the same ratio to the total annual carrying charges as local benefits bear to the total benefits. Such an apportionment indicates that on the basis of the present estimated total first cost of \$340,000, local interests would be required to make a cash contribution of \$85,000, or 25 percent of the cost of construction. Of the total estimated annual carrying charges of \$12,500, local interests would bear \$3,000, representing annual costs of the required local contribution to the Federal project. Local interests should also be required to furnish all lands and easements necessary for the prosecution and maintenance of the work.

71. In June 1956 the Ogunquit Village Corporation was requested to indicate whether local interests would be willing and capable of meeting the necessary requirements of local cooperation. On December 17, 1956 the Village Corporation voted in favor of the plan of improvement and has indicated willingness to participate in the project. An analysis of the financial capability of the Ogunquit Corporation, based on population, assessed valuation, present tax commitments, indebtedness and its legal borrowing limit, indicates that the Corporation would be capable of meeting the requirements of local cooperation.

#### CONCLUSIONS

72. It is the opinion of the Division Engineer that additional anchorage area of about one acre with a depth of 5 feet in the Flat Pond anchorage basin of Josias River, Ogunquit, Maine, is needed to provide anchorage for anticipated increases in the existing fishing and recreational fleets now using the basin. The benefit cost ratio for the proposed improvement is 1.3. The total estimated first cost of construction is \$340,000.

73. A local cash contribution of 25 percent of the construction cost should be required in view of the extent of local benefits to be derived from the project. The presently estimated local cash contribution is \$85,000. Adequate terminal facilities open to all on an equal basis are provided within the anchorage. The share of the first cost to be borne by the United States is estimated to be \$255,000. Funds for the entire improvement should be appropriated in one fiscal year in order to assure economical prosecution of the work.

74. It appears probable that the Ogunquit Village Corporation would be willing and able to meet the necessary requirements of local cooperation for Federal construction of the desired improvement.

75. It is further the opinion of the Division Engineer that the single breakwater originally proposed by local interests would not offer significant protection as desired. In addition, it is concluded that the needs of navigation in Josias River, do not warrant the expenditures necessary for the construction of a system of breakwaters adequate to reduce storm wave action at the entrance and to provide sheltered anchorage of approximately 3.0 acres. Officials of the Ogunquit Village Corporation have indicated that the extent of local cooperation which would necessarily be required for the construction of a system of breakwaters could not reasonably be expected at this time.

### RECOMMENDATION

76. It is recommended that the existing project for Josias River be modified to provide an additional anchorage area of about one acre at a depth of 5 feet in extension to the existing 5-foot Flat Pond Anchorage basin as shown on the inclosed map. The total estimated cost of construction is \$340,000. The cost to be borne by the United States is estimated to be \$255,000 with \$500 annually for maintenance in addition to that now required.

77. This modification is recommended subject to the conditions that local interests (a) contribute in cash 25 percent of the cost of the anchorage extension, the local cash contribution now being estimated at \$85,000; (b) furnish all lands, easements and rights of way necessary for prosecution of the work, and hold and save the United States free from damages due to the construction and maintenance of the improvement.

Incl.  
Map

ALDEN K. SIBLEY  
Colonel, Corps of Engineers  
Division Engineer

